March 10, 2004

Ms. Ellen Caldwell (6WQ)
Water Quality Protection Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

RE: Comments on TMDL for Bayou Lafourche for BOD, Louisiana
Federal Register Notice February 9, 2004
Volume 69, No. 26

Dear Ms. Caldwell:

The Louisiana Department of Environmental Quality (LDEQ) has reviewed the TMDL for Bayou Lafourche for oxygen demand noticed in the February 9, 2004 Federal Register (Volume 69, Number 26). This TMDL was prepared by a contractor for Region 6 EPA. LDEQ's general comments are presented below, and LDEQ's detailed technical comments regarding this TMDL are enclosed as an attachment.

In general, the LDEQ does not agree that a TMDL is necessary for Bayou Lafourche for oxygen demanding substances because LDEQ assessed this reach of Bayou Lafourche and found it to be fully supporting the dissolved oxygen standard. Subsequent to LDEQ's assessment of Bayou Lafourche, EPA's contractor conducted a survey of the bayou during critical conditions in September, 2003, and found the bayou meeting the dissolved oxygen standard.

I am advised that the contractor incorrectly interpreted data and used inappropriate default values in the model, even when historical data for Bayou Lafourche was available to develop the model inputs. As such, this TMDL is poorly done and unacceptable in its current state. The model does not consider tidal dispersion or wind-aided reaeration. Bayou Lafourche is affected by tidal fluctuations and wind-driven tides. The model utilized was LAQUAL, which has a component for dispersion but is a steady-state model. The model should have included a dispersion factor, but instead the modeler assumed zero dispersion. Ideally, it would have to be rerun utilizing a dynamic model, at least for the lower reach of the bayou below the weir at Thibodaux, to account for the high degree of dispersion there. Then the LAQUAL model could be rerun for the upper reach. Suitable dynamic models include DYNHYD and WASP. Since the lower reach of Bayou Lafourche is fairly wide, the modeler should have also included the wind-aided reaeration factor.

This TMDL of zero for Bayou Lafourche is unacceptable and cannot be implemented. A TMDL of zero means that all current discharges of BOD and all sources of SOD to Bayou Lafourche would have to be discontinued.

LDEQ had submitted technical comments to EPA on the first draft of this TMDL in December, but it appears that no revisions were made to the model based upon those comments. LDEQ's initial comments are also enclosed.

If the EPA would like to confer with LDEQ regarding this TMDL, arrangements can be made through Ms. Emelise Cormier or Ms. Barbara Romanowsky of my staff.

Sincerely,

Karen Geautreaux, Deputy Secretary
Louisiana Department of Environmental Quality

Cc (w/ attachments):
Governor Kathleen Babineaux Blanco
Len Bahr, Office of the Governor
Sidney Coffee, Office of the Governor
Beverly Ethridge, Region 6 EPA, Baton Rouge
Jane Watson, Region 6 EPA
Golam Mustafa, Region 6 EPA
Barbara Romanowsky, LDEQ/EED
Emelise Cormier, LDEQ/ETD

Review of a Draft TMDL Report for Bayou Lafourche Dec 16, 2003

This review is focused primarily on the model calibration. Simply put, we cannot believe the modeling scenario presented by the calibration. Specific problems are as follows.

1. The survey covered Bayou Lafourche from Donaldsonville to Larose with just three sampling sites, one at LDEQ Site LA0023 near Donaldsonville, one at LDEQ Site LA0293 at Thibodaux, and one at LDEQ Site LA0111 at Larose. The number of sites is just barely acceptable – LDEQ would probably have sampled six sites, three above and three below the Thibodaux weir.

2. The nutrient algae cycle was modeled, based on a finding that there is an algae problem in Bayou Lafourche. The model was calibrated to *Chlorophyll a* data as follows:

Donaldsonville	5.5
Thibodaux	5.0
Larose	13.0

   Settled algae was converted to SOD, giving the model such a high oxygen demanding load that, in order to calibrate to measured dissolved oxygen, CBOD and ammonia decay rates were set very low, and organic nitrogen was not decayed at all. In addition, there is no nonpoint loading or benthic production of ammonia in the model.

   Unfortunately, the data cited above were the raw *chlorophyll a* data and include *pheophytin*. The corrected *chlorophyll a* data, which should be used, as reported by the Iowa University Laboratory are:

Donaldsonville	<1, <1
Thibodaux	<1
Larose	7, 3, <1

   These data indicate that there is little algal activity in Bayou Lafourche. It is suggested that the model be recalibrated without the nutrient-algae cycle. It may not even be necessary to put the *chlorophyll a* found at the Larose site in the initial conditions, and apply the default "Algae Oxygen Production" of 0.05 mg O2/ug *chlorophyll a*/day.

3. There was no continuous monitoring of DO or day/night sampling, and thus no evidence of the diurnal DO cycle that would be expected if algae was a problem at the time of the survey. We can't tell from the DO data collected if the model was calibrated to an appropriate dissolved oxygen, or if the DO data was just a random sampling of a diurnal DO cycle. Without such data, however, it must be assumed from the low corrected *chlorophyll a* results that there is no diurnal cycle and the in-situ DOs are representative of the bayou.

4. Section 3.13 – reaeration
   The reaeration coefficient of 0.6/day was based on a LDEQ study between Napoleonville and Labadieville, above the Thibodaux weir. This is good for the upper non-tidal reach but may not be appropriate for the lower, tidal, reach.

   LAQUAL is capable of simulating tidal velocities by a tidal prism calculation in a situation such as this, and uses a composite of tidal and adjective velocity to calculate reaeration from a number of different relations. Data is also available to adjust reaeration for wind effects, and in the lower

portion of Lafourche this is probably also significant. It is possible that reaeration was underestimated in the lower portion of Bayou Lafourche where the minimum summer season DO occurred.

5. Concerning critical temperatures for projection, there are 5 LDEQ stations on Lafourche with enough data to estimate a 90 percentile temperature. The defaults are probably very close to the 90 percentiles, but an actual critical temperature should be calculated.

6. Twenty day suppressed BODs were run and used as ultimate CBOD. If a CBOD decay rate of 0.08 is assumed, these CBODs would be about 20% lower than the ultimate CBOD. A conservative adjustment such as this would be justified. Before adopting the "proposed" method for CBOD (described in Standard Methods), LDEQ ran a suppressed 20 day BOD series and calculated an ultimate CBOD assuming a first order decay.

7. We could find no explanation of the "reported" flow for point sources that is used in the calibration. What was the source of these figures? Permit applications in EDMS? It is preferred that these be a measured flow, or in the absence of a measurement, a design flow based on the design figures in the State Sanitary Code.

   Are the "permitted" flows that are used in the projections the flow categories for facilities with general permits? It is preferred that these be a design flow based on the design figures in the State Sanitary Code.

8. Sections 3.10 & 3.11 – Manning coefficient of 0.021 and dispersion not simulated.

   Downstream of the Thibodaux weir, Bayou Lafourche is tidally affected, and tidal dispersion was not simulated. The Manning coefficient does translate to a very small advective dispersion, but tidal dispersion is neglected.

   Since there is presently no data for tidal dispersion in Louisiana's coastal estuaries, the contractor could not simulate tidal dispersion with LAQUAL. There is, however, sufficient tidal data to allow a non-steady state model, such as DYNHYD/WASP to simulate the dispersive effect of the tides.

   However, there are no large point sources to disperse, so this omission of dispersion would only be a problem at the lower boundary if that boundary was, for example, at a windswept lake where dissolved oxygen levels would be expected to be high. Dissolved oxygen at the boundary at Larose would probably not be higher or lower than upstream reaches, so the absence of tidal dispersion probably did not affect the result.

9. The lower boundary dissolved oxygen was set at 90% of DO saturation for the projections. There is no reason to believe that the lower boundary dissolved oxygen at Larose would be any higher or lower than the projected DO at Larose. If tidal dispersion is not being simulated, there is no reason to set lower boundary conditions or use an ""Ocean Exchange Ratio" other than zero.

10. The contractor interpreted the standard levels of treatment in the LTP as written, but not as intended. A secondary discharge from a small treatment plant is represented as 30 $CBOD_5$, 15 NH_3-N, 7.5 Org-N, instead of 30/10/5. Since the discharges are small, and the same numbers were used for calibration and projection, this assumption is probably not causing a problem. This problem has been corrected in the latest version of the LTP.

11. It would be helpful if the contractor would list the point source wasteload allocations.

12. A brief scan of the report shows insufficient documentation and numerous minor errors.

1. No changes were made to the calibration that was objected to in LDEQ comments of 12/16/03. The calibration is based on an incorrect interpretation of the *chlorophyll a* data, a suspect assumption of reaeration for the reaches below the Thibodaux weir, default rather than calculated 90 percentile water temperatures, and an assumption of zero tidal dispersion in the reaches below the weir. Although the comments of 12/16/03 state that the zero dispersion assumption was probably not a problem, a steady state model of a tidally affected water that does not simulate tidal dispersion must be suspect. The sensitivity runs indicate that the model is most sensitive to algal parameters, reaeration, and water temperature. These are the parameters that are most suspect.
2. Zero summer season TMDLs (for oxygen demand and nutrients), and therefore, zero allocations, were assigned to Bayou Lafourche Subsegment 020401, Donaldsonville to LaRose, because dissolved oxygen criteria could not be met by 100 percent point source and headwater reductions. This is not possible. The TMDL is never zero.
3. The only summer projection run in the appendix is the one with a headwater flow of 19 cms. If this is the TMDL run, there is no nonpoint loading, no incremental loading, no background SOD, no benthic ammonia; only headwater loading, point sources, and settled algae conversion to SOD. All three of these do, however, count as total maximum daily loading. If the TMDL run is the one with all headwater and point source loading eliminated, the TMDL is still not zero. SOD from settled algae is a load and would, in this case, constitute the entire TMDL.
4. It is stated in Section 4.3 that with all point source loading eliminated, the model did not project that DO criteria would be met. The loading for this run presumably consisted of headwater loading and SOD from settled algae. The misreading of the chlorophyll a data may therefore be responsible for the resulting zero wasteload allocations for point sources.
5. Car washes were intended to be represented in the model as UBOD = 2.3 x BOD5 = 2.3 x 0.71 x COD. The contractor has not converted BOD_5 to UBOD for the calibration and projection datasets in the appendices. This also raises the question; should we convert all COD and TOC limits to BOD using some literature value of a BOD/COD or BOD/TOC ratio, and would these facilities then get BOD limits?
6. Treatment levels for point sources were taken from an older version of the LTP. Secondary treatment is represented as 45 BOD_5 / 15 NH_3-N / 7.5 Org-N. The current LTP, issued 9/22/03, specifies that secondary treatment be represented as 30 BOD_5 / 15 (NH_3-N + Org-N).